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ABSTRACT

One of 33 self-paced instructional modules for training industry services leaders to provide guidance in the performance of manpower services by public agencies to new or expanding private industries, this module contains three sequential learning activities on developing performance tests for industry services programs. The first learning activity is designed to provide the learner with the needed background information on developing performance tests (criterion referenced tests) for job training based on performance objectives. The second learning activity gives opportunity to apply the information in a practice situation, and the final checkout activity allows the learner to develop performance tests in a real work situation, such as when employed or when serving as an intern learner. Feedback devices (learner self-test and performance checklist) are included for use by the learner and instructor/supervisor to assess progress. Case study information, sample performance objectives, sample performance test, process evaluation checklist, and an end product evaluation checklist are appended for guidance in performing the learning activities. (This module is the fourth of seven on preparing training materials.) (JT)

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MODULE NUMBER VIII-D

DEVELOPING PERFORMANCE TESTS

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SELF-PACED
INSTRUCTIONAL MODULE

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INSTRUCTIONAL PROCEDURE

This module contains two sequential learning activities and a final check-out activity. A brief overview precedes each learning activity and the final check-out activity. Each learning activity and the final check-out activity provide learning experiences to help you accomplish the objectives. Feedback devices (self-test and checklist) are provided to help you determine when each objective has been accomplished.

The first learning activity is designed to provide you with the needed **background information**. The second learning activity is designed to give you an opportunity to apply that information in a **practice** situation. The **Check-Out Activity** is the final learning activity. It is designed to allow you to develop performance tests in a real work situation, such as when you are employed or when you are serving as an intern learner.

After reading the **Objectives** and the **Introduction** on page 3, you should be able to determine how much of this module you will need to complete before the **Check-Out Activity**.

* If you already have the necessary **background information** required for developing performance tests, you may not need to complete **Learning Activity I**, p. 4 .
* If you already have had **practice** in developing performance tests, you may not need to complete **Learning Activity II**, p. 13.
* Instead, with the approval of your instructor or supervisor, you may choose to proceed directly to the **Check-Out Activity**, p. 14, and attempt to develop performance tests when you have access to a **real work situation.**

Your instructor or supervisor may be contacted if you have any difficulty with directions, or in assessing your progress at any time.

SUPPLEMENTARY TEACHING/LEARNING AIDS

An effort has been made to make this module as self-contained as possible. The information contained in the module should be sufficient to develop "entry-level" knowledge and skills. However, much more has been written on this topic. The advanced learner may wish to attain higher levels of knowledge and skills.

A list of resources which supplement those contained within the module follows. Check with your instructor or supervisor (1) to determine the availability and the location of these resources, and (2) to get assistance in setting up additional learning activities.

There are no prerequisites for completing this module. However, the module may be used in conjunction with module number VIII-A, **Conducting a Task Analysis**; and module number VIII-B, **Developing Performance Objectives**.

Learning Activity I

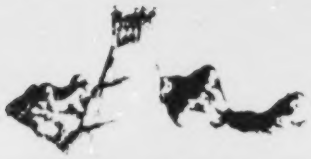
* Boyd, Joseph L., Jr.; and Shinberg, Benjamin. **Handbook of Performance Testing: A Practical Guide for Test Makers**. ED 052 200. Princeton, New Jersey: Educational Testing Service, 1971, p. 189.
* Davis, Robbie G. "Measurement of Performance Skills in Career Education," **Man, Society and Technology**. 35 (November, 1975), pp. 52-54.
* Denton, William T. **Student Evaluation in Vocational and Technical Education**. ED 089 098. Columbus, Ohio 43210: The Center for Vocational Education, The Ohio State University, 1960 Kenny Road, 1974, p. 34.
* Mager, Robert F. **Measuring Instructional Intent: Or Got A Match?** Belmont, California 94002: Fearon Publishers, Inc., 6 Davis Drive, 1973, pp. 15-65.
* Pucel, David J.; and Knaak, William C. **Individualizing Vocational and Technical Instruction**. Columbus, Ohio 43216: Charles E. Merrill Publishing Company, 1975, pp. 171-190.

Learning Activity II

* Local instructor from a trade related to the industry jobs under consideration

Check-Out Activity

* Industry representative, e.g., manufacturing engineer, quality control technician, or machine operator



OBJECTIVES

I. After completing the required reading, take the learner self-test to demonstrate you have attained the knowledge of developing performance tests. You should complete all items correctly. **(Learning Activity I)**

II. After analyzing the performance instructions, complete all the designated experiences in developing performance tests in a practice situation. Your work must conform to the checklist provided. **(Learning Activity II)**

III. In an actual work situation, develop performance tests for the training program under consideration in your community. Satisfactory performance will be realized when all items on the performance checklist (Appendix A) are rated "yes." **(Check-Out Activity)**

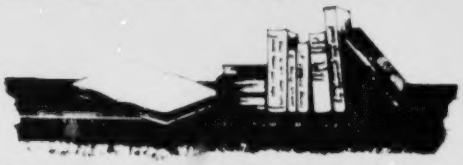
DEVELOPING PERFORMANCE TESTS

1. INTRODUCTION

It is generally conceded that written tests of trade knowledge are not a very dependable way to evaluate skill performance, and that without some type of direct or indirect measure of actual performance it is unlikely that an accurate assessment of an individual's trade competency can be made.

Measuring performance may be conducted by instructors, industry supervisors, and skilled workers. A "test" may take the form of a written exercise, such as solving a set of arithmetic problems or listing the steps of procedure for a task. More often, however, it should involve the actual demonstration of a skill in a realistic setting with equipment similar or identical to that used in the industry.

This unit will provide information which will assist the industry services leader in developing performance tests for industry services programs.



LEARNING ACTIVITY I: INFORMATION

You should study the information presented on the following pages. You may wish to read supplementary information from outside sources concerning performance-based instruction. After reading these materials, you will demonstrate knowledge of developing performance tests by completing the **Learner Self-Test**, p. 9. You will be evaluating your knowledge by comparing your self-test answers with the **Answers to Self-Test**, p. 11.

I. WHAT IS A PERFORMANCE TEST?

A performance test requires the learner to demonstrate a skill or a task in a setting very similar to or identical to actual work conditions. The demonstration may occur at the institution training site, or on the job, in the case of an in-plant training program. The test would require the learner to perform such tasks, for example, as assemble a mold, install a relay, or weld a joint. The test must be referenced to the criterion (standards) established for successful task performance. Therefore, the instrument that measures mastery of a task may also be called a criterion-referenced test.

II. THE NEED FOR PREFORMANCE OBJECTIVES

Performance objectives are needed in order to attain the highest degree of accuracy and better results from performance tests. Performance tests should parallel the stated

performance objectives. Performance objectives provide directions for assessing the learner's achievement.

III. ELEMENTS OF A PERFORMANCE OBJECTIVE

A. A statement of the task to be performed

B. Conditions and limitations under which a learner will be expected to perform the specified task

1. Where is the task to be performed?
2. What tools, equipment, and supplies may be used?
3. How much time is allowed to complete the task?
4. What are the references to be used, if any?

C. Criteria of acceptable performance

1. What are the standards for judging the performance?
2. What evidence will be used to judge acceptable performance?
3. Who will evaluate the performance?

IV. INFORMATION INCLUDED IN A TEST OR EVALUATION INSTRUMENT

A. Tools, equipment, and materials necessary for performing the task

B. References that may be used, if any

C. Time allowed for task completion

D. Detailed instruction for performance

E. Criteria of acceptable performance

V. SUGGESTED STEPS IN PLANNING A PERFORMANCE TEST

A. Specify the objective.

B. Decide whether to develop a process or an end product evaluation instrument.

1. List the procedural steps if a process evaluation is used.
2. List the points to be observed after the performance is completed if a product evaluation is used.

C. Identify items crucial to the task being performed.

D. **Determine if an instructor checklist is needed when an end product evaluation is involved. (See Section VII.)**

E. **Establish performance standards necessary for each step if a process evaluation is used.**

F. **Determine the minimum performance score acceptable for this instrument.**

VI. TYPES OF PERFORMANCE TESTS

A. **Tests that evaluate the "process."** The "process" evaluation is a test used when the evaluator observes the learner as he/she performs a skill. The rating or score is based on how well the learner completes the steps in the process. In the "process" evaluation, the items are based on the steps of procedure which the learner must complete in order to satisfy the performance. (See Appendix D.)

One job of the instructor or evaluator is to determine how to break down a job into its basic steps so that each part can be evaluated. When identifying or stating the steps, the following criteria may be used:

1. Each step should begin with a verb.
2. Each step should be independent of the others. Do not evaluate the same performance more than once.
3. Only one performance should be included in each step.
4. All the steps added up should equal the total performance of the task at hand.

In some instances, it may be advantageous to evaluate the individual's care of equipment, observance of safety rules, adherence to certain prescribed methods, amount of materials wasted, etc.

Since the evaluation of work processes is time consuming and does not lend itself to as much objectivity, it is not favored in most instances. The importance attached to process evaluation is a value judgement and depends to a large degree on the purpose of the evaluations.

In some instances, process evaluation may be the only type of evaluation practical. Consider the case of some service occupation in which the finished job consists of unobservable results. Suppose the objective is for a supervisor to counsel

an employee about absenteeism. The process evaluation of this task would be the best way to determine if the supervisor had accomplished the task correctly.

B. **Tests that evaluate the "end product."** In the "end product" evaluation, the evaluator observes the end product and compares it with pre-established criteria. The primary consideration is how well the finished product compares with the criteria. What must the product look like, feel like, or sound like? What must the product do or not do? The objectives would be stated in terms of what can be seen, felt, or heard after the processes are completed. The same four criteria for writing objectives employed in the process evaluation will apply in the case of the end product evaluation. The verb, however, is stated in the past tense. (See Appendix E.)

VII. INSTRUCTOR CHECKLISTS

The instructor checklist is desirable when a product is to be manufactured or assembled, and certain portions cannot be observed after passing a particular point. For example, a learner may be asked to assemble a bearing in an electric motor. It would be impossible for the instructor to observe/determine if the bearing has been correctly installed once the cover is installed. On the other hand, if the instructor uses a checklist, he/she could inspect the bearings before the cover is installed. The instructor checklist contains a list of the points to be inspected during the process of completing the product. This process could save time and avoid frustration caused by having parts incorrectly installed.

VIII. THE LEARNER SELF-TEST

The learner self-test is a device included in a unit of instruction to allow the learner to check his/her progress toward final performance of a task. It is primarily used to check on the cognitive or knowledge phase of the learning that usually forms the first instructional activities. Because it is a self-test designed to help learner's improve their knowledge, it is not to be utilized by the instructor for purposes of grading. In the sequence of instructional activities, the self-test will

typically be placed immediately following the readings or other cognitive experiences.

The learner self-test may take a variety of forms, depending on the subject matter approach. These forms may include the following:

A. **Questions that require short essay-type responses**

B. **Review items in a textbook or film to which the learner is referred**

C. **A series of objective test items, e.g., multiple choice or fill-in-the-blank**

D. **Diagrams, charts, sequence lists, etc., that require completion**

E. **Paper-and-pencil problems to solve**

F. **Test items presented orally on tape**

Correct answers to self-test items should accompany the unit of instruction. The learner should be given the results of the self-test to reinforce correct responses, and to provide an opportunity to learn the material missed on the test. Model answers may be given for some test items. Other items require correct solutions, answers, or completed devices. The correct responses can be given at the bottom of the page (perhaps upside down to avoid peeking), on the back of the self-test sheet, or on a separate sheet. The instructor should not be involved either in administering the self-test or furnishing the responses. Of course, any learner who has questions or difficulty with the self-test has the option of talking it over with the instructor.

*Continue this learning activity by taking the **Learner Self-Test** which follows.

LEARNER SELF-TEST

This is a checkpoint knowledge test needed before proceeding to develop performance tests in a practice situation. Follow the instructions provided for each item. Check your answers with the **Answers to Self-Test** which follow. If you fail to complete all items correctly, you may wish to refer back to parts of the module information.

1. A performance test involves the learner's demonstration of a skill or task in a setting very similar to, or the same as, the actual on-the-job working conditions. Circle the correct answer.

   True False

2. The performance test should parallel the stated _____ _____. (Fill in the blank.)
3. Name three components of a well-written performance objective.

   a.

   b.

   c.
4. Name four components of a performance test.

   a.

   b.

   c.

   d.
5. In _____ evaluation, the items are typically steps of procedure which the learner must complete in order to satisfy the performance. (Fill in the blank.)
6. When a product is to be assembled so that certain parts will not be observable beyond a given point, an instructor _____ is employed to evaluate the performance. (Fill in the blank.)

ANSWERS TO SELF-TEST

1. True
2. Performance objective
3. a. Statement of task to be performed
   b. Conditions and limitations under which the learner will be expected to perform
   c. Criteria of acceptable performance
4. Any four of the following:
   a. The tools, equipment, and materials necessary for performing the task
   b. The references, if any, that may be used
   c. The time allowed for the test completion
   d. The detailed instructions for completing the test
   e. The criteria of acceptable performance
5. Process
6. Checklist

*Proceed to the next learning activity for practice in developing performance tests.

LEARNING ACTIVITY II: PRACTICE PERFORMANCE

Prior to developing performance tests in a real work situation, you will be required to practice writing performance tests. You may wish to refer back to the information found in the module. You may wish to read several articles on performance-based instruction from outside sources. Then, secure the necessary references and materials and develop at least two performance tests. One test should evaluate the "process" and the other should evaluate the "end product." You will be evaluating your performance in preparing performance tests by using the **Performance Checklist** from Appendix A.

I. Read the information in Appendices C, D, and E which provides samples of performance objectives and performance tests.

II. Assume you have been assigned the responsibility of coordinating a training program in your community. You are specifically faced with the task of assisting the instructor in developing performance tests for the purpose of evaluating the skills of the learners.

III. Assume that one job involved in the industry is that of fabricating metal components by the process of welding.

IV. Analyze the job to determine the various tasks crucial to the success of the job.

V. Decide which of these you will include in your test. Remember, you are interested in selecting enough elements of the job to have a representative sample.

VI. After deciding what tasks you will use to design tests, take the following steps:

A. Develop a performance objective for each test you plan to develop. The performance objective should state exactly what the learner is to do in order to demonstrate his/her performance of the task. It should also give the conditions, limitations, and the criteria of acceptable performance.

B. Develop the performance test. It should include:

1. The equipment and materials necessary for performing the task.
2. The references, if any, that may be used.

3. The time allowed for the completion of the task.
4. A list of detailed instructions as to how to go about completing the test.
5. The criteria of acceptable performance.

VII. Check your competency in developing performance tests using the **Performance Checklist** from Appendix A. All items in the checklist should be rated "yes."

*Completion of this learning activity should have prepared you for developing performance tests in a real work situation. Proceed to the **Check-Out Activity**.

CHECK-OUT ACTIVITY: PERFORMANCE IN REAL WORK SITUATION

The activity which follows is intended to be conducted in an actual work situation. It may be completed without completing the two learning activities, if you think you have the knowledge and skills to do so.

You must plan and develop performance tests for an industry services program that is in progress in your community. You may consult with the local industry services instructor for information concerning the development of the tests. Your performance will be judged by your instructor or supervisor using a checklist. All items on the **Performance Checklist** (Appendix A) must be rated "yes."

APPENDIX A

PERFORMANCE CHECKLIST

Developing performance tests.

INSTRUCTIONS: If the performance is satisfactory, write YES in the space provided. If the performance is unsatisfactory, write NO in the space. Each item must be rated "yes" for satisfactory task performance.

1. A performance objective was developed for each test. ☐
2. The tools, equipment, and materials necessary for performing the test were identified. ☐
3. The references, if any, to be allowed were listed. ☐
4. A clear list of instructions as to how to go about completing the test was given. ☐
5. The criteria of acceptable performance were listed. ☐
6. The test consisted of a representative sample of the elements or steps in the task. ☐
7. Steps crucial to the success of task performance were listed. ☐

☐

☐

APPENDIX B

SAMPLE PERFORMANCE OBJECTIVE

TASK TO BE PERFORMED

The learner will lay out, cut, and build a set of stairs for a simulated residential structure.

CONDITIONS OR LIMITATIONS

The learner will be provided with all materials, tools, and equipment necessary to complete the task. The learner will lay out and cut two stringers, and four risers or kickers. He/she will lay out and cut four pieces of lumber 1-1/8" x 12" to serve as treads. One piece of lumber 1" x 8" will be cut to tie the stairs to the structure. Another learner may assist, but may do only those things as directed by the learner being tested. No references other than the plans and specifications for the residence under construction may be used.

CRITERIA OF ACCEPTABLE PERFORMANCE

The learner's performance must meet the following criteria, as judged by a qualified observer:

1. Applicable procedures and materials must satisfy the requirements stated in the plans and specifications of the residence under construction.
2. All work must be completed within two hours.
3. The completed task must meet the following criteria:
   a. Lay out the stringers according to the height of the porch from the ground.
   b. Cut the risers and treads on each stringer according to the lay out lines.
   c. Cut an amount off the back of the top part of each stringer equal to the thickness of the riser board.
   d. Cut an amount off the bottom of the lower end of the stringer equal to the thickness of the treads to make the height of each riser uniform.
   e. Attach 1" boards to risers of each stringer.
   f. Attach 12" boards to the treads of each stringer. The tread should overhang the riser by 3/4".
   g. Bevel the edge of the tread according to the blueprint.
   h. Plumb stairs so that all angles are 90 degrees (where applicable).
   i. Attach stairs to porch according to the blueprint.

APPENDIX C

SAMPLE PERFORMANCE TEST

EQUIPMENT AND MATERIALS: Simulated residence, tools, lumber, and nails

REFERENCES: Plans and specifications for the simulated residence

TIME LIMIT: 2 hours

INSTRUCTIONS:

The evaluator will ask you to lay out, cut, and assemble a small set of stairs for a simulated residence. Another learner may assist, but may do only those things as directed by the learner being tested. You will show the learner where to perform the task and advise him/her of the procedures to be followed according to the plans and specifications of the structure being constructed. The learner's performance must meet the following criteria:

1. Applicable procedures and materials must satisfy the requirements stated in the plans and specifications of the simulated residence under construction.
2. All work must be completed within two hours.
3. The completed task must satisfy the following criteria:

	YES	NO	COMMENTS
a. The stringer was laid out according to the height of the porch.			
b. The risers and treads of each stringer were cut according to the layout lines.			
c. The top end of each stringer was cut to allow a piece to fasten stairs to porch.			
d. An amount equal to the thickness of the treads was cut off the lower end of each stringer to allow for uniform height of each riser.			
e. A 1" board was attached to the risers of each stringer.			
f. Twelve-inch boards were attached to the treads of each stringer.			

	YES	NO	COMMENTS
g. The edge of each tread was beveled according to the blueprint.			
h. The stairs were plumbed so that all applicable angles were 90 degrees.			
i. The stairs were fastened to the residence according to the blueprint.			

Total score possible=9

Minimum Mastery Level Score = 7

Yes = 1

No = 0

APPENDIX D

PROCESS EVALUATION CHECKLIST

BRAZE WELD A TEE JOINT

COURSE: Welding

GIVEN: Two flat pieces of aluminum, oxyacetylene torch and related equipment, flux, and aluminum welding rods.

PERFORMANCE: Braze weld two pieces of aluminum together to form a "tee."

STANDARDS: (See checklist below.)

Instructor Checkpoint	Items to be Observed	Yes	No	Criteria (basis for making judgment)
1.	Select the correct type of welding rods.	1	0	Aluminum alloy
2.	Apply fresh clean flux along the joint and to the welding rod.	1	0	Paste flux is visible
3.	Heat joint, and as the flux begins to turn liquid, apply the rod in a circular motion.	1	0	Base metal turns yellow. Rod begins to melt at the joint.
4.	Cool the finish brazed joint to below 900°F.	1	0	The joint was not disturbed. Allowed to cool at room temperature. (No water was used.)
5.	Clean the flux from the joint.	1	0	All flux was removed.

APPENDIX E

END PRODUCT EVALUATION CHECKLIST

BRAZE WELD A TEE JOINT

COURSE: Welding

GIVEN: Two flat pieces of aluminum, oxyacetylene torch and related equipment, flux, and aluminum welding rods.

PERFORMANCE: Braze weld two pieces of aluminum together to form a "tee."

STANDARDS: (See checklist below.)

Instructor Checkpoint	Items to be Observed	Yes	No	Criteria (basis for making judgement)
1.	The angle formed between the two pieces	1	0	Tee had a shape of 90°
2.	Appearance of finished weld.	1	0	Smooth with no excessive buildup
3.	Strength of joint	1	0	No breaks from bend test

Total Score _____

Total Score Possible = 3

Minimum Mastery Level Score = 3

LIST OF INDUSTRY SERVICES LEADERSHIP DEVELOPMENT MODULES

I. **Orientation to Industry Services**

- A. Introduction to Industry Services
- B. Industry Services Leadership Development Program: Guide for Using the Self-Paced Instructional Modules

II. **Establishing Contacts and Relationships**

- A. Speaking to Industrial and Community Groups
- B. Writing Articles for News Media
- C. Identifying Functions of Agencies Involved in Industry Services
- D. Developing a Brochure for Industry Services

III. **Obtaining Agreements**

- A. Developing Training Agreements
- B. Developing a Lead-time Schedule
- C. Interpreting Legislation Related to Industry Services

IV. **Identifying Training Needs**

- A. Collecting Framework Production and Training Information
- B. Selecting Types of Training Programs
- C. Preparing a Budget for an Industry Services Project

V. **Acquiring Resources**

- A. Selecting Instructors for Industry Services
- B. Securing a Training Site
- C. Securing Training Equipment, Tools, and Supplies

VI. **Training Instructors for Industry Services**

Training Instructors for Industry Services

VII. **Preparing for Training**

- A. Adapting the Training Site to Training Needs
- B. Evaluating Safety Conditions at Training Sites
- C. Announcing the Opening of a Training Program

VIII. **Preparing Training Materials**

- A. Conducting a Task Analysis
- B. Developing Performance Objectives
- C. Determining Types of Instructional Methods and Media
- D. Developing Performance Tests
- E. Developing Training Manuals
- F. Preparing Videotapes for an Industry Services Program
- G. Setting Up Learning Centers for Industry Services Programs

IX. **Selecting Candidates**

Developing a Plan for Testing and Counseling Applicants for a Training Program

X. **Monitoring Training Programs**

- A. Assisting in Providing Pre-Employment and In-Plant Training
- B. Developing a Procedure for Keeping Participating Agencies Informed About Training Program Activities
- C. Monitoring Training Programs for Progress and Expenditures

XI. **Closing Training Programs**

Closing a Training Program

XII. **Placing Program Participants**

Developing a Plan for Placing Graduates of a Pre-Employment Training Program

XIII. **Evaluating Industry Services Programs**

Evaluating Industry Services Programs

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